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Price and Politically Induced Productivity Changes Affecting CO_2 Emissions of Danish Electricity Producing Plants

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The most discussed measures to mitigate CO_2 emissions in climate policy are CO_2 taxes and tradable CO_2 certificates. Both policies aim at creating incentives to (a) adopt sustainable technology solutions and (b) to use energy sources more efficiently. Denmark is one of the few countries worldwide that since the early 90ies has introduced both measures into its climate policy portfolio. During the same time period, crude oil prices have undergone considerable variability, though, with a long-term upwards trend. This development has lead to the reduction of relative prices of sustainable energy sources. Applying an extended production data set on Danish electricity producing plants, we quantify the effects of both CO_2 taxes and CO_2 certificates -- while controlling for changes in relative energy prices -- on CO_2 abating technical progress and efficiency measures. We model CO_2 as a second (bad) output as done in Färe et al. (2005) and Kumar and Managi (2009) and apply the decomposition of the Luenberger productivity index, as developed by Chung and Färe (1997) in order to separate changes in technical progress and changes in efficiency. Thereby, we measure the effects of changes in relative energy prices and climate policies on both the magnitude as well as on the input/output bias of technical change. Furthermore, we analyze the effects on technical and allocative efficiency. To the time of the deadline, the empirical analysis is not yet finished. We will present our results at the conference.

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